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AN EVALUATION OF THE AGE-SEX DATA OF RECENT AFRICAN CENSUSES

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I. INTRODUCTION

1. This paper evaluates the age-sex data of recent population censuses conducted by member States of the Economic Commission for Africa. 1/ The censuses evaluated are mainly from the 1980 round (i.e.,1975-1984) of African population censuses.The two types of data that were utilized for the analyses from these censuses were the tabulated statistics on age for single and five-year age groups.

2. Age is a fundamental variable for the study of demographic and related socio-economic factors. Important uses of the age data include the classification and tabulation of demographic and related socio-economic variables as well as the preparation of population estimates and projections. Also, for the analyses of demographic and socio-economic characteristics, for example, pertaining to fertility, mortality and migration along with labour force participation, educational attainment, occupational status and income level, which vary with age, age can be employed as a "control" variable.

3. Despite the aforementioned and other uses of the age data the measurement of age in African population censuses and demographic surveys has been fraught with problems, with the result that the collected age data are affected by errors and deficiencies. The basic reason is that majority of the population are ignorant of their ages in exact numbers. Thus,the two major sources of errors and deficiencies in the age data include,(a) failure to report ages and (b) misstatements of ages that are reported.

4. A systematic pattern of age misstatements and coverage errors in African censuses have been delineated, including: (a) underreporting of women in their teens, (b) over-statement of the ages of adult females, and (c) underreporting of infants especially those under one year. 2/

5. Sex is another variable that is widely used for the classification and tabulation of demographic and related socio-economic variables. However unlike age, the question on sex in African censuses does not present definitional or classification problems. 3/ Nonetheless,partly due to the method and instruments of data collection employed in demographic inquiries, studies have identified selective coverage errors especially of female respondents, especially with respect to labour force participation information.

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1 For a previous similiar analysis see,ECA,"Comparative Analysis of Accuracy of Census Age distribution for Selected African Countries",African Population Studies Series no.2 (1975)

2 E. van de Walle, "Characteristics of African Data," in W. Brass et al The Demography of Tropical Africa (New Jersey: Princeton University Press ,1968), p.13

3 ECA,Study of Methods and Problems of the 1970 Round of African Population and Housing Censuses, E/CN.14/CAS. 10/5, Addis Ababa, Oct. 1977

6. The paper contains,apart from the introduction,the following sections. Section II presents and discusses the results of the evaluation of the accuracy of the single- and five-year age-sex data of recent African population censuses. Section III briefly reviews the methods for the adjustments of age errors,while Section IV presents a discussion on the various sources of age-sex errors in Africa population censuses. The final Section V, contains a summary and conclusions of the paper.

II. COMPARATIVE EVALUATION OF THE AGE-SEX DATA OF RECENT AFRICAN POPULATION CENSUSES

7. One method for the detection of errors in the age-sex data of censuses is by using two sets of records to compare individual reports on ages.The records could be acquired through reinterview surveys such as the post enumeration surveys (PESs) or other comparative data sources.The second method consists of comparing the reported age distribution with an expected age-sex configuration,for instance,stable or quasi-stable populations. The third approach involves subjecting the reported age distributions of various age cohorts to close scrutiny in order to detect irregularities.

8. In African settings there exists a number of problems in applying the first two methods. Firstly, comparable data systems such as PESs are few, and more important,have been found to be affected by similiar errors as the census. Also,the few published tabulations from this source have omitted crucial information which should throw light on the complex issues of age misreporting and selective coverage errors of African censuses. Secondly, the changing demographic parameters of African populations in recent years do not justify the utilization of stable or quasi-stable models.

9. Consequently,the analytical technique that will be mainly utilized are based on the third approach.

A. Evaluation of the Accuracy of the single-year age-sex data

10. For the evaluation of the single-year age data for the extent of digit preference or avoidance use is made of the Myers' Index. Essentially, by the Myers' Index, a "blended" population is estimated encompassing a weighted sum of the number of respondents in each of the ten terminal digits. It is assumed by this method that barring systematic irregularities in reported age distributions, the "blended" sum at each terminal digits ought to roughly equal to 10 per cent of the total "blended" population. Hence if the total at any digit is more than 10 per cent of the total "blended" population this points to overselection of ages in that digit (digit preference);and vice versa for underselection of ages (digit avoidance). The index of

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4 R.J. Myers, "Errors and bias in the Reporting of Ages in Census Data", Transactions of the Actuarial Society of America, 41,104 (October 1940)

preference is a summary measure of the extent of digit preference and/or avoidance in an age distribution. It is derived as one-half of the absolute sum of the deviations from 10 percent of each of the ten terminal digits. 5/

11. Table A.3 presents Myers indexes of preference for selected ECA member States, while Table 1 gives the relative ranking of the countries by these indexes for the 1980 round of censuses.

12. These two tables point to extensive digit preference/avoidance in the reported age distributions of the selected member States. This practice was more serious in the western African sub-region where countries like Gambia, Guinea-Bissau, Liberia and Niger recorded high indexes of preference for both males and females. The indexes of preference for the two countries of Southern Africa in the sample were low. Also, overall, the indexes for females were generally higher than those of males.

13. Table A.4 provides summary measures from the Myers index on the patterns of digit preference/avoidance for all terminal digits, 0,1,2,3...,9 in the age range 10-69 for selected ECA member States. Although a diversity of patterns emerge, however, general trends are also discernible. One is that the patterns of digit preference/avoidance mirror the trend indicated above by the indexes of preference. For example, digit preference/avoidance were relatively minimal in Congo, Mauritius, Rwanda, Sao-Tome and Principe, Swaziland and Tunisia, and extensive in Comoros, Gambia, Mauritania, and Niger.

14. Between these two sets of countries, that is, with minimal and very extensive terminal preference/avoidance, were the following: Burundi, Equatorial Guinea, Tanzania, Zambia, Ghana and Burkina Faso, where digit preference/avoidance occurred in limited digits especially 0.

15. With respect to the preference for certain terminal digits, the evidence shows that 0 and 5 were the preferred digits in the majority of countries (e.g., Botswana, Burundi, Burkina Faso, Comoros, Equatorial Guinea, Gambia, Ghana, Tanzania and Zambia). With respect to the avoidance of certain terminal digits, 1 was avoided in especially Comoros, Gambia, Niger and Tanzania; while 9 was avoided mainly in in Gambia, Niger and Ghana. On the other hand, in Sao Tome and Mauritius, countries whose data did not show particular preference/avoidance of digits, digit 0 was slightly avoided while 1 was slightly preferred.

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5. UN, Population Division "Accuracy tests for census age distributions tabulated in five-year and ten-year groups", Population Bulletin no 2, October 1952; and "The accuracy of quality of basic data for populatio estimates" in Methods of Appraisal of Quality of Basic data for Population Estimates, ST/SOA, Series A (Population Studies) no 23.

TABLE 1

RELATIVE RANKING BY MYERS INDEX OF PREFERENCE , SELECTED ECA MEMBER STATES 1980 ROUND OF CENSUSES

INDEX	MALE Country(year)(index)	FEMALE Country(year)(index)
1. Low under 10	Tunisia(84)(1.8)	Tunisia(84)(3.0)
	Sao Tome(81)(2.2)	Sao Tome(81)(1.9)
	Congo(84) (4.3)	Congo(84) (4.9)
	Equatorial Guinea(83)(6.8)	Mauritius(83)(1.1)
	Burundi(1979)(7.0)	Rwanda(78)(5.2)
	Kenya (1979)(6.4)	Kenya(1979)(8.1)
	Seychelles(77)(0.4)	Seychelles(77)(0.4)
	Zambia (80) (7.1)	Zambia (80)(7.5)
	Malawi(1977)(6.6)	Malawi(1977)(8.6)
	Botswana(81)(3.7)	Botswana(81)(3.8)
	Swaziland(86)(5.6)	Swaziland(86)(5.6)
3. Medium 10 to 19	Benin (79)(18.20)	Ghana(84)(17.0)
	Mauritania(77)(16.4)	Senegal (76)(11.2)
	Cameroon (76)(15.4)	Cameroon(1976)(19.2
	Central African Rep.(1975)(11.1)	Central African Rep.(1975)(15.8)
	Ghana(84)(14.0)	Burundi(1979)(11.0)
	Tanzania(78)(13.2)	Tanzania(78)(16.9)
3. High over 20	Gambia (83) (22.1)	Gambia (83)(25.9)
	Guinea Bissau(74)(20.0)	Guinea Bissau(22.6)
	Liberia(84)(20.0)	Liberia(84)(26.8)
		Mali(76)(25.2)
		Mauritania(77)(20.3
	Niger(77)(38.9)	Niger(77)(43.2)
	Comoros(80)(24.7)	Comoros(80)(26.5)

Source : Table A.3

B. Evaluation of the Accuracy of the five-year Age-Sex data

16. The analytical methods that are used to evaluate the five-year age and sex data are: the age ratio score, the sex ratio score and the United Nations joint age-sex accuracy index. 6/

17. The age ratio used here is the number of persons multiplied by 100 reporting the ages in a five-year age group to the arithmetic mean of the numbers below and immediately above the former five-year age group. If there has not been any violent fluctuations in births, deaths or migration, the two age groups should be roughly equal to 100. Another assumption for an expected age ratio of 100 is that errors of coverage are uniform from age to age and that net reporting errors converge to zero. Age ratios mainly estimate net age misreporting and not net census error.

18. The age ratio score, a summary measure of the accuracy of an age distribution, is estimated by adding the average deviations (without regard to sign) from 100 of the individual age ratios of all the ages. When this index is high, the census data on age is probably inadequate, and vice-versa when it is low, i.e. nearer to zero.

19. A typical pattern of the sex ratio is follows: beginning from about 105 at birth it declines slowly at younger and middle ages and faster at older ages. Due to the effects of cumulative decline in the sex ratio with age, the possibility for the mean differences between two sex ratios at adjacent ages to be zero especially at the older ages, is slim even for populations with smooth sex-age distributions.

20. The use of the sex ratio, (i.e., the number of males per 100 females) in the evaluation of the sex-age data of censuses is based on the following reasoning. Given that in recent years, the population has not been influenced by such factors as birth cycles, birth deficits, military casualities and large and discontinuous migrations, differences between the sex ratios for successive quinquennial age groups and deviations of quinquennial age ratios from one (or 100) would be slight up to age 70.

21. An overall measure of the accuracy of the sex distribution of census age data is the sex ratio score. This is the mean of the absolute successive differences of age-sex ratios. The lower the index, i.e., closer to zero, the more satisfactory the census data on sex would appear.

22. One important shortcoming of the sex ratio should be noted, that is, its inability to distinguish between deviations attributable to authentic age pattern sex ratio changes from that due to errors in the data and under- and over-enumeration.

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6 idem

23. The United Nations Joint age-sex accuracy index combines the sums of the (1) age ratio score (2) the sex ratio score and (3) three times the mean of the age-to-age differences in estimated sex ratios. The evaluation scheme of census age data by the UN index is as follows: under 20 -accurate; 20 to 40-inaccurate;above 40 -highly inaccurate.

24. Grouping of the age-sex data into quiquiennial groups should smoothen some of the irregularities identified above pertaining to the single year age data. However despite the aggregation,the grouped data display patterns of irregularities, which we shall examine in this sub-section,starting with the sex ratio.

1. Sex ratio

25. Table A.2 presents the sex ratios (number of males per 100 females) for quinquennial age groups and the total population for selected ECA member States for the periods 1970s and 1980s. An examination of the information indicate that there are a marked differences of total sex ratios between countries in the sub-Saharan Africa subregions (i.e.; West, Central and East/Southern) and in the North Africa sub-region. In the former, the sex-ratios were generally under 100, whilst in the latter they were all over 100.

26. Taking 95-105 as the usual range of the total sex ratio,the evidence also shows that they were unusually low in Benin (92),Burkina Faso (93) and Cape Verde (85) in West Africa; Burundi (94), Malawi(93), Mozambique (95), Botswana (89) and Lesotho (93) in East/Southern Africa; Central African Republic (92), Equatorial Guinea (92) in Central Africa; and high in Cote d'Ivoire (107) in West Africa; Djibouti (108) in East/Southern Africa; and Libya (106) in North Africa.

27. A number of countries in these two groups have over the years experienced either high emigration or immigration (for example, Burkina Faso, Cape Verde, Botswana, Lesotho, Swaziland, Djibouti and Libya), which largely explains their abnormal sex ratios.

28. The quinquennial sex ratios shown in Table A.2 display two main patterns of errors. Firstly, in the majority of countries the number of males vis-a-vis females increased from age group 0-4 to 10-14. This is especially the case for twelve out of the fourteen countries of West Africa (that is, barring Cape Verde and Gambia), twelve out of the sixteen countries of East/Southern Africa (that is, barring Botswana, Lesotho, Mauritius, Rwanda and Seychelles), three out of the five countries of Central Africa, and three out of the five countries of North Africa. These increases are pronounced in Benin, Cameroun, Central African Republic, Liberia, Niger, Sierra Leone, Sudan and Togo. Discounting migration which should be minimal for such age groups, the likelihood for misstatements of ages and/or underenumeration of females seem probable.

29. Secondly, with respect to the age groups 15-19 and 20-24, the numbers of females are excessive, in particular when compared with the age group 10-14: in Benin, Gambia, Liberia, Mali, Mauritania, Niger, Senegal and Sierra Leone in West Africa; Botswana, Burundi, Comoros, Madagascar, Malawi, Seychelles, Tanzania and Zimbabwe in East/Southern Africa; in Cameroon, Central African Republic, Congo and Equatorial Guinea in Central Africa and Sudan in North Africa. With respect to these cases the assignment of determinants should take into account migration as well as misstatements and/or upward allocation of females aged 10-14 to the age group 15-19.

30. To complement the above aggregate analysis, the sex ratios of following countries are next examined for systematic errors.

a.Libya (1982)

31. The total sex ratio was 106,which is slightly above the acceptable range.All seventeen age groups from 0-4 to 80 plus recorded excesses of males,which were pronounced i.e., above 105, for the age groups 40-44 to 55-59 as well as 10-24,65-69 and 75-79. Immigration mainly explains these excesses of males in particular for the working ages,15-64. However, even for some of these cases, and more so for the younger age groups, age misreporting as well as selective coverage of the sexes in the enumeration should also be taken into account.

b.Sudan (1984)

32. The total sex ratio of 102 falls within the acceptable range.However,a closer examination of the sex ratios by ages indicates some irregularities: beginning at 105 at age 0-4 it rises to 108 and 112 in the next successive quinquennial groups,5-9 and 10-14. The sex ratio drops suddenly from ages 15-19 up till 30-34. These violent fluctuations of the sex ratios are partly due to age misreporting and differential enumeration the two sexes. The same explanation apply to the very high excesses of males in the older age groups,40-69.

c.Benin (1979)

33. The overall sex ratio of 102 is well below the plausible range.Starting at 100 at 0-4, the excesses of males increase in ages 5-9 and especially 10-14,120. But from 15-19 marked excesses of females occur up to ages 60-64,barring 55-59. This erratic pattern of sex ratios should be explained mainly by age misreporting and selective under- and -overenumeration.

d.Niger (1977)

34. The total sex ratio of 98 which falls within the acceptable range,when considered alone, provides a misleading picture of the pattern of sex ratios in Niger.Beginning at 105, the sex ratio climbs to 110 and 122 in the age groups,5-9 and 10-14.It suddenly drops to 72,69,75 and 90 for the successive quinquennial age groups.The older age groups record even more implausible sex ratios, such as,159 and 173 for age groups, 45-49 and 55-59 respectively. These unrealistic sex ratios are undoubtedly the

result of age misreporting and selective under- or over-enumeration.

e.Cameroon (1976)

35. The total sex ratio of 96 lies slightly within the acceptable range. Specifically, the sex ratio starts at 101 rises slowly to 102 but very steeply to 10-14. From this level it drops suddenly from 116 to 95 at ages 15-19.This age group and the next six record excesses of females,very pronounced for ages 20-44.Some of these irregular patterns of the sex ratios are partly due to age misreporting and/or selective under-enumeration of either sexes.

36. The results of the evaluation of the sex ratios by the sex ratio score is now reviewed, with the review restricted to the 1980 round (i.e.,1975-1984) round of African censuses (Table 2).

37. By sub-regions, the sex ratio scores are lower in Southern, Central, and Northern Africa, compared with Western and Eastern Africa. For the three countries of Southern Africa, the sex ratio score was below 7, while it was below 10 for Central and Northern Africa. Sex ratio scores in Northern Africa were relatively low in Tunisia (4.39) and especially Algeria (3.45). Also in Central Africa, relatively lower scores were recorded by Cameroun (5.45), Congo (3.66) and Sao Tome and Principe (3.40).

38. In Eastern Africa, the sex ratio scores vary from 2.21 for Mauritius, one of the lowest for Africa, to 11.05 for Comoros.The other countries in this sub-region with relatively low sex ratio scores include: Burundi (5.04) Kenya (5.75), Madagascar (4.92) and Rwanda (4.36).

39. Undoubtedly, the poorest data on sex distribution in ECA member States according to the sex ratio score were from Western Africa, where the scores vary from 5.71 for Ghana to 27.24 for Niger, the highest for all selected ECA member States. Other countries in the sub-region that recorded high sex ratio scores were Gambia (14.25) Guinea-Bissau (14.86) and Mali (12.42).

2. Age Ratio

40. Table A.1 presents the age ratios for quinquennial age groups separately for males and females for selected ECA member States for the periods 1970s and 1980s.

41. The data for various countries display the following patterns. Firstly, for most of them, that is, barring Algeria, Cape Verde, Egypt, Equatorial Guinea and Senegal, an age ratio in excess of 100 is recorded for the age group 5-9. Secondly, similar patterns of age ratios are discernible for males and females, that is, an excess of 100 or vice-versa in one sex is usually replicated in the other. Thirdly, a majority of the countries recorded age ratios under 100.

42. Apart from these patterns, the age ratios fluctuate from age to age and country to country.

43. The evidence shows that the age ratio score were generally lower for males compared with females. Also, apart from the Southern African Sub-region, where the scores for the three countries, vary from 3.09 to 8.97 for males and 4.74 to 8.85 for females, the scores were high in most countries in the other sub-regions. In Eastern Africa the age ratio scores vary from 3.54 to 26.51 for males and 3.92 to 31.12 for females; in Central Africa, from 3.15 to 18.92 for males, and 3.79 to 25.92 for females; in North Africa from 5.14 to 17.70 for males, 5.92 to 20.64 for females; and West Africa, the sub-region with the highest scores, from 5.64 to 28.58 for males, and 10.21 to 48.34 for females.

44. To complement the above aggregate analysis, the age ratios of six countries are next analysed for systematic patterns of errors.

a. Algeria (1977)

45. The age ratios of Algeria for males and females recorded troughs (i.e., deficits of 100) in the age groups, 5-9, 15-19, 30-34, 50-54 and 60-64, and excesses of 100 in the remaining age groups. The ratios fluctuate erratically especially at the beginning and ending age groups.

46. More specifically, taking an absolute deviation from 100 of 2 per cent as normal, 5 out of the 13 quinquennial age classes for males and 3 for females fall within this range. Also, the age ratio scores are : 5.80 for males and 5.92 for females, among the best for North Africa.

b. Botswana (1981)

47. The age ratios for Botswana is relatively free from pronounced fluctuations compared with other African countries. For example, if we take an absolute deviation from 100 of 2 per cent as normal, 7 out of the thirteen quinquennial age groups for males and 5 for females fall within the range. All the same the following age groups display marked excesses or deficits of 100 for both sexes : 15-19, 20-24, 30-34, 35-39 and 50-54, part of whose explanation is out-migration and part missreporting. The age ratio scores are : 3.09 for males, and 5.75 for females.

c. Liberia (1984)

48. The age ratios of Liberia for both males and females have excesses of 100 within the same age groups: 5-9, 15-19, 25-29, 35-39, 45-49, 50-54 and 60-64. Alternatively there were troughs for the remaining age groups identical for both sexes: 10-14, 20-24, 30-34, 40-44, 55-59, and 65-69.

49. The excesses and deficits of 100 were more marked for females than males. Also, the age ratios for both males and females display erratic fluctuations especially at the beginning and ending age classes. Taking an absolute deviation from 100 of 2 per cent as normal only 3 of the 13 quinquennial age groups for

males and 1 for females fall within this range. The age ratio scores are: 7.24 for males and 10.35 for females.

50. To conclude, the quinquennial age ratios for selected ECA member States examined globally and individually above display pronounced fluctuations characterised by sharp peaks (i.e. excess of 100) followed by troughs (deficit of 100). These deviations of the age ratio were generally steeper at the beginning and ending age groups. While some of the deviations could be attributed to migration and mortality, misstatements of ages, selective under-reporting of certain sexes and age groups and digit preference were the more important determinants.

C. Overall evaluation of the age-sex data

51. For the overall evaluation of the age-sex data of selected ECA member States for the 1970s and 1980s, the joint score index is employed (table 2). To recall, the scale of evaluation by this index is as follows: accurate: under 20; inaccurate: 20 to 40; and highly inaccurate: above 40.

52. On the whole, according to the joint score index, the age-sex distributions of the selected ECA member States were highly inaccurate, with the situation pronounced in the Western and Eastern African sub-regions compared with the Northern, Central and especially the Southern sub-regions. At the country level, the scores vary from 17.92 in Congo to 158 in Niger.

53. Only the age-sex data from the Congo could be described as accurate, that is, under 20. However, the following additional countries with scores under 26 barely fall outside this range: Kenya, Madagascar and Mauritius in Eastern Africa; Sao Tome and Principe in Central Africa; Algeria and Tunisia in North Africa; and Botswana in Southern Africa. No country in West Africa qualified.

54. Also, among the remaining countries, the following fall within the inaccurate range,that is, with scores between 27 and 40 : Burundi, Seychelles and Zambia in Eastern Africa; Cameroun in Central Africa ; Libya in North Africa ; Ghana, Liberia and Senegal in West Africa and Lesotho and Swaziland in Southern Africa.

55. In the rest of the remaining countries, that is, those not mentioned above, the age-sex distributions are very high. The numbers are about evenly distributed among sub-regions, with the exception of the Southern African sub-region which had none.

D. Trends in the Accuracy of the Age-Sex Data of African Censuses conducted in the 1960s,1970s and 1980s

56. Over the years some improvements have taken place in the reporting of the age-sex data of successive African population censuses conducted in the 1960s,1970s and 1980s.This is evident by an examination of the joint-scores and Myers indexes of more recent and those of earlier censuses of the following countries with information: Algeria,Botswana,Ghana,Kenya,Liberia,Morocco, Sierra Leone,Tanzania,Tunisia and Zambia (tables A.3 and A.5).

TABLE 2

Age ratio, sex ratio score and joint index score for Selected African Countries a /

Country/ sub-region	Age ratio score male	Age ratio score female	sex ratio score	Joint score index
Eastern Africa				
Burundi/1979	7.73	10.91	5.04	33.77
Comoros/1980	26.51	31.12	11.05	90.78
Djibouti/1983	17.65	22.49	9.73	69.34
Kenya/1979	4.45	3.92	5.75	25.61
Madagascar/1975	3.54	5.35	4.92	23.64
Malawi/1977	14.09	8.56	8.48	48.09
Mauritius/1983	9.00	8.56	2.21	24.20
Mozambique/1980	11.79	13.46	7.51	47.77
Rwanda/1978	6.58	6.25	4.36	25.90
Seychelles/1977	5.05	9.33	7.97	38.35
Tanzania/1978	10.07	9.12	9.08	46.42
Uganda/1969	9.35	13.56	9.49	51.37
Zambia/1969	17.04	9.07	15.00	72.01
/ 1980	5.14	9.87	7.70	38.12
Central Africa				
Cameroun/1976	6.96	6.43	3.49	31.13
Central African Rep. /1975	18.92	25.92	9.37	72.96
Congo/1984	3.15	3.79	3.66	17.92
Equatorial Guinea/1983	12.90	19.74	11.30	66.54
Sao Tome and Principe/1981	6.74	5.92	3.40	22.87
Northern Africa				
Algeria/1977	5.80	5.92	3.45	22.08
Egypt/ 1976	12.58	15.70	9.68	57.33
Libya/1973	5.42	11.26	6.77	36.98
Morocco/1971	15.6	26.9	17.1	93.8
/ 1982	10.72	17.98	9.65	57.66
Sudan/1973	17.70	20.64	9.19	65.90
Tunisia/1984	5.14	6.32	4.39	24.64
South Africa				
Botswana/1971	6.1	6.4	6.2	31.3
/ 1981	3.09	5.75	5.58	25.58
Lesotho/1976	8.97	8.85	5.27	33.64
Swaziland/1986	6.22	4.74	6.98	31.90

(Contd.)

Country/ Subregion	Age ratio score male	Age ratio score female	sex ratio score	Joint Score Index
Western Africa				
Benin/1979	12.26	14.90	10.84	59.69
Burkina Faso/1975	11.61	15.90	10.14	57.93
Cape Verde/1980	14.87	12.74	6.14	46.04
Cote d'Ivoire/1975	6.72	10.21	9.89	46.60
Gambia/1983	16.33	26.25	14.25	85.32
Ghana/1960	15.0	20.6	9.6	63.8
/ 1970	10.2	12.0	7.2	42.7
/ 1984	9.67	10.89	5.71	37.68
Guinea Bissau/1979	14.05	20.08	14.56	78.71
Liberia/1984	7.24	10.35	7.27	39.41
Mali/1976	10.83	20.90	12.42	68.98
Mauritania/1977	11.34	15.10	6.37	45.55
Niger/1977	28.58	48.34	27.24	158.63
Nigeria/1963	30.46	37.70	14.06	110.35
Senegal/1976	5.64	10.03	7.49	38.11
Sierra Leone/1963	12.0	15.2	14.6	70.7
/ 1974	13.50	16.07	8.46	54.95
Togo/1981	14.03	13.16	8.72	53.35

57. For instance,the joint score index of Algeria came down from a level of 74 in the 1954 census to 22 in the 1977 census.Also Botswana,one of the African countries with fairly accurate age-sex data, recorded the following declining joint score indexes: 39,31,and 26 in the 1964,1971 and 1981 population censuses.In addition the Myers indexes for both sexes declined from 5.1 in 1971 to 3.7 in 1981.

58. Similarly in Ghana,which has a relatively long census experience,the joint score index declined in each succesive population censuses: from 53 in 1960 to 38 in 1984.(It should be pointed out,however,that the score for 1984 is fairly high).The Myers index for both sexes also declined from 30 in 1960 to 16 in 1984.

59. Another African country with serious distortions in its age-sex data that experienced improvements over successive censuses is Sierra Leone: the joint score decreased from 71 in 1963 to 55 in 1974,although the latter index is still relatively high.

E.Differential Accuracy of the Census Age-Sex Data

60. One important differential in the accuracy of the reporting of the age-sex data,identified above, is that between males and females. According to the available evidence the reported and recorded ages of males in African population censuses are more accurate compared with those for females.

61. In Tunisia,for example,the Myers index of preference for males calculated from the 1984 population census was 1.8 compared with 3 for females. In Liberia, the Myers index of preference for males in the 1984 census was 20 compared with 27 for females (table A.3).

62. Another important differential in the reported and recorded age-sex data is that between urban and rural areas. Table A.5 contain a summary of information on this topic. The evidence indicate that ages were better reported in urban compared with rural areas. For instance, the Myers index of preference for the urban areas of Benin during the 1979 population census was 16 vis-a-vis 22 for the rural areas.

63. A study of this differential with respect to the Liberian 1974 population census noted: "Urban areas consistently had better age records and reporting than rural areas, just as female age reporting was consistently inferior to that of males..."7/

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7. P.O.Ohadike,"Determinants of Quality of Age Data: A Case Study of The Liberian 1974 Census",RIPS Working Papers,RIPS/WPS/2/87

In one of the rare studies on the determinants of spatial and socio-economic differentials of African population census age-sex data, a positive correlation between the level of socio-economic development (defined in terms of variables such as literacy and white-collar job) and the quality of age reporting and recording was established .8/

64. In another study, adult literacy was found to exert a significant negative influence on the Myers index of preference: "disparities in the level of illiteracy between men and women and among sub-regions [were] the main reason for the observed differentials in the indexes of preference".9/

III. ADJUSTMENTS FOR ERRORS OF THE AGE-SEX DATA

65. Adjustments of the age-sex data for errors are made easier by the availability of other comparable good quality data, which could be used as the standard against which the former could be evaluated. Given the incompleteness of alternative data sources in a number of African countries, adjustments of such data is relatively limited.

66. The results of post enumeration surveys (PESs) have been shown as one of the sources for adjusting population census data by the identification and quantification of mainly coverage errors. In this connection the PES of the Liberian 1974 population census, based on the dual record system is used to illustrate this approach.10/ It has been established that the adjusted male age data corrected from information from the PES provided an age-sex structure as well as vital rates derived from it, which were closer to a stable population age-sex structure and vital rates derived from it.11/

67. Moreover, the tabulated estimated age-sex completeness from the PES, gave some evidence about errors e.g., the more complete coverage of females aged 15 to 44 compared with those under 10 and over 45; declining completeness of coverage for males and females 15 to 19 years as well as improvement for males up to ages 60, and for females up to age 45. This sort of information could be used for corection of the data.

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8. idem

9. Mohamed Bailey, "Patterns of Digit Preference and Avoidance in the Age Statistics of Some Recent African Censuses: 1970-1982", unpublished manuscript

10. Economic Commission for Africa/Regional Institute for Population Studies, Workbook on Demographic Data Evaluation and Analysis. RAF/87/P03 (Addis Ababa: 1989

11. E.S. Mark and John C. Rumford, "The 1974 Post-Enumeration Survey of Liberia-A New Approach", in K. Kroti (ed.) Development in Dual System Estimation of Population Size and Growth. (Edmonton: The University of Alberta Press, 1978)

68. Another piece of data that could be used for adjustment of defective age data is historical uncorrected tabulated age-sex data. A large data set of this information,stratified, for example, by various major regions,could provide insight about peculiar but common patterns of age distortions,which could be used as a basis for adjustment.12/

69. Also,stable/quasi-stable models could be used for the correction of defective age-sex data,for countries where their conditions are approximately satisfied.This is made possible by the development of "some standard patterns of age misreporting and relative underenumeration...." 13/ This approach was utilized to adjust the population over 35 from the 1970 population census of Ghana and the adjusted age-sex distribution used to estimate vital rates.

70. Mathematical techniques,e.g.,the Carrier-Farrag ratio method, quadratic and osculatory interpolations-have also been employed to generate 5-year age groups that have been adjusted for net reporting errors. The principal criticism of this approach centres on the mechanical nature of the adjustment,resulting,in some cases,in the disregard of irregular pecularities of the age-sex distributions.

IV. SOURCES OF AGE-SEX ERRORS IN AFRICAN POPULATION CENSUSES

71. To provide the background to the discussion on the recommendations of this paper on strategies to enhance the quality of the age-sex data of African population censuses, this section briefly reviews the sources of age-sex errors. The following four topics will be highlighted, namely: (a) ignorance of ages on the part of the respondents (b) imputation of unknown ages by enumerators (c) data collection procedures, and (d) uses of guidelines such as the historical calendar. At the outset, it has to be pointed out that there is limited information from African censuses on most of these issues.

72. One of the basic reasons behind age misreporting in population censuses of African countries is due to the fact that a large number of respondents, because of illiteracy and/or lack of knowledge of ages in calendar terms,are ignorant of their ages in exact numbers. In these circumstances, studies have found out that the ages of a substantial number of respondents are provided by enumerators and other third parties such as the heads of household, whose estimates of ages have been observed to be flawed. A methodological analysis of the age data of the Sierra Leone 1963 population census by Gilbert,for instance, estimated that roughly half of the reported ages, 20-24 and above, and one-third of the total ages were provided by enumerators and other third parties such as heads of households. 14/

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12. ECA,"Attempt at Adjustment of Severely Inaccurate Age Distribution Countries of Tropical Africa",African Population Studies Series,no.2,1975
13. Ewbank op.cit
14. M.A. Gilbert, The Sierra Leone Census of Population of 1963, Central Statistics Office, Freetown, 1963, unpublished manuscript

73. On misreporting of ages imputed by enumerators, Gibril in a study involving comparison of ages stated in transcripts of tape recordings of the Gambian 1973 census interviews with the ages recorded by enumerators on the questionnaires detected that they (the enumerators) either over- or under-stated one-quarter of their reported ages of respondents.15/

74. In the estimation of ages in African countries resort has also been made to a number of guidelines such as the historical calendar, identification cards and similiar records along with physical appearance, which have introduced errors in the age data.

75. The historical calendar, that is, a list of local and/or national events, has been experimented with in e.g., the 1963 census of Sierra Leone, the 1960 census of Ghana, and the 1967 census of Tanzania. Their usefulness, however, in reducing age misreporting errors has been debated.

76. In some African countries, for example, Ghana(1960) and Tanzania (1967) that experimented with the historical calendars, their usefulness was greatly reduced by their exclusion of local events, which the majority of illiterate rural populations more easily relate to. Even with national events, studies have found out that some population groups, especially in rural areas were not familiar with them.

77. Moreover, it has been observed that the African countries that experimented with them in their past population censuses did not invest enough time and care in their preparations and uses.

78. These and other problems of the historical calendars have called into question their usefulness in reducing age misreporting in African and other censuses:

> Efforts to improve age reporting in surveys through the use of local calendars of historical events are probably a waste of time and money [except] for estimating the ages of children under age 10. The evidence... suggests that these calendars are rarely used properly in large surveys and censuses and that when they are used they are apt to lead to biased estimates of ages for adults.16/

80. A related method for the estimation of ages is that based on information on identification cards and similar records which confer benefits on individuals. Use has been made of these documents in the Senegal 1976 and Libyan 1964 censuses. Apart from errors that crop up by the rough calculation of the enumerators, the authencity of information on such records are usually suspect. A review of the Senegalese experienced noted that "the information on the identification records in many cases were inaccurate, [and] such inaccuracies were also reflected in the age data collected".17/

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15. M.A.Gibril,Evaluating Census Response Errors: A Case Study of the Gambia.Paris: OECD,1979
16. Ewbank, op.cit.
17. ECA,"A Study of Methods...",op.cit.

81. Estimates of ages in African population census have also been based on physical appearance and/or biological relationships, such as, the weaning of a child or his first walking and a guessed age at marriage. Analysts have reported that this sort of information distorts the reported age distributions. For example, it results in understatement of the ages of unmarried and overstatement of the ages of married 15 to 19 year-old females. In this context, Gibril's study of the Gambian 1973 census, mentioned above, for instance, indicated that enumerators were prone to misreporting the ages of women over 20 because they utilized information on their parity when estimating ages.

82. Another source of error in the age data of African demographic inquiries is related to the type of questions on age included, e.g.: (a) age in completed years or months, (b) date of birth and (c) date of birth and completed years or months.

83. The use of each of these questions have advantages and disadvantages.18/ With respect to the question on only completed years/months, this may be the only feasible method in countries such as in Africa where the overwhelming majority of the population do not know their ages. Of course the estimated ages so derived will be affected by errors of misreporting. The compromise questions whereby those respondents who know their dates of birth are given the option to provide this information and those that do not have their ages estimated, has the advantages that it takes cognizance of the fact that a growing number of persons in many African countries especially the younger generation, know their dates of birth. That this more refined information on age should be collected, along with the crude estimates, has much to recommend it.

84. The third approach, the provision of the age data only be means of data of birth, ought to provide a richer source of data for countries, such as Mauritius, where the registration of birth is almost universe. However, in other countries, where this condition is not satisfied, the adoption of this method would not improve the method based on estimates from completed years. Also, certain digits, especially multiples of 10 e.g. 0 and 5, are usually over-represented in answers to this question. This was the case in the 1969 population census of Zambia, where ages ending in 0 and 4 were over-represented. Moreover, since a large number of the population, especially among the older generations, are ignorant of their births, "not stated", cases were usually high, for example in the 1974 census of Zambia.

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18. idem.

IV. SUMMARY AND CONCLUSIONS

85. This paper has attempted an evaluation of the age-sex data of recent African population censuses, mainly those conducted during the 1980 round. Its major findings could be summarized as follows, that: (a) the age-sex distributions of the selected ECA member States were, on the whole inaccurate, with the situation pronounced in the Western and Eastern sub-regions compared with the North, Central and South; (b) over the years, some improvements have taken place in the reporting of the age-sex data of successive African censuses, that is,those conducted in the 1960s, 1970s and 1980s, although in a number despite these improvements, the recent reported ages are still highly inaccurate; (c) the reported and recorded ages of males were more accurate than those of females and (d) ages were better reported in urban than rural areas.

86. With respect to sources of errors in the reported age-sex data of current African population censuses, the analysis revealed that they were attributable to a number of of factors, such as, ignorance of ages on the part of respondents because of illiteracy and/or lack of knowledge of ages in calendar terms; imputation of unknown ages by enumerators and other third parties; data collection procedures especially the types of questions on age included on census questionnaires, and assignment of unknown ages by using guidelines such as the historical calendar.

87. On the basis of the findings of this paper, the following recommendations are put forward aimed at improving the quality of the age data in future African population censuses, namely:-

a. An evaluation has to be made by census statisticians - in, for example, pre census tests of the questionnaires - about the most suitable questions on age to be included. This review should take into account social and cultural factors of the country that have some bearing on knowledge about age, and also the fact that a growing number of the population - the young - know their current ages.

b. Since coverage errors contribute to distorted age reporting in African censuses, an effort should be made to minimize their occurrence, by for instance, the performance of meticulous cartographic work and complete enumeration of persons usually prone to be missed, such as infants, servants and person not in definable households.

c. To enhance our current knowledge about age misreporting and age selective under- and over-enumeration to facilitate the institution of appropriate corrective measures, census statisticians should provide tabulations from information obtained in re-interview surveys such as the PES, on the types of errors by various population sub-groups e.g. by marital and economic status along with parity. Also, more research to throw light on the interview process should be conducted.

d. Finally, is the recommendation on the careful selection and training of the field staff, especially enumerators. The saliency of this proposal for African countries is attested by experienced demographers who have worked in less developed countries. Thus,according to one,"the allocation of additional resources in terms of interviewers and supervisors can have substantial effects on age reporting even in countries with high illiteracy levels".19/An important advantage of this recommendation is that it can be easily implemented by African countries that still have to conduct censuses in the 1990 round.

19. W.Seltzer,Demographic Data Collection,An Occasional Paper, Population Council,1973,p.10

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TABLE A.1: AGE RATIO IN FIVE-YEAR AGE GROUPS, SELECTED ECA MEMBER STATES

Western Africa - Age Ratios 1970s and 1980s

	Benin 1979		Burkina Faso 1975		Cape Verde 1980		Cote d'Ivoire 1975	
Age-Group	M	F	M	F	M	F	M	F
5-9	117.4	114.6	114.3	114.3	89.0	87.1	109.0	110.2
10-14	83.7	70.9	91.5	84.7	108.6	108.4	86.0	75.1
15-19	84.6	96.3	104.7	100.4	118.4	108.7	89.8	106.0
20-24	88.4	111.6	80.8	89.3	89.8	102.2	103.5	96.1
25-29	114.6	119.3	107.8	116.3	79.2	94.4	109.4	114.2
30-34	97.4	87.1	94.6	95.7	68.5	65.7	92.0	91.9
35-39	105.9	103.0	102.8	95.1	78.7	85.2	103.2	102.9
40-44	89.7	90.6	97.6	105.3	117.9	125.6	97.8	93.7
45-49	104.4	100.9	95.2	87.3	104.8	101.6	101.6	97.1
50-54	104.2	107.1	112.0	121.1	117.6	113.4	95.3	101.0
55-59	82.3	75.0	86.1	73.1	76.4	72.7	96.9	83.9
60-64	119.9	131.5	124.4	138.2	100.2	102.4	101.1	113.4
65-69	86.0	80.8	69.2	63.8	107.5	106.6	82.6	77.2

	Gambia 1983		Niger 1977		Mauritania 1977	
Age Group	M	F	M	F	M	F
5-9	116.8	119.2	111.3	108.9	118.9	118.9
10-14	88.2	78.8	80.8	61.4	89.5	81.2
15-19	90.9	101.1	104.5	135.6	100.8	103.8
20-24	95.1	93.1	87.0	92.5	97.2	98.5
25-29	115.5	119.5	102.4	105.6	95.5	96.9
30-34	95.5	97.7	111.4	112.3	94.6	100.0
35-39	94.5	83.3	87.4	69.3	88.0	85.5
40-44	106.0	117.7	125.6	146.3	123.9	136.7
45-49	89.2	73.7	66.7	50.0	86.0	79.5
50-54	119.1	142.9	153.9	202.1	111.4	117.7
55-59	69.5	54.9	55.1	38.7	95.4	89.8
60-64	145.9	179.3	128.4	265.0	106.8	115.7
65-69	69.2	57.0	48.2	35.4	68.2	60.2

Age Group	Ghana 1984		Guinea Bissau 1979		Liberia 1984		Mali 1976	
	M	F	M	F	M	F	M	F
5-9	113.2	113.5	110.3	114.2	104.9	106.8	105.9	106.0
10-14	94.0	91.1	92.7	74.9	95.1	83.0	85.6	78.9
15-19	101.1	93.8	99.1	105.3	102.0	109.6	110.0	113.5
20-24	90.4	102.0	81.9	91.8	93.8	100.3	85.9	88.5
25-29	103.8	106.2	119.5	129.7	107.5	105.2	99.0	108.6
30-34	98.2	96.2	82.9	79.6	90.6	87.7	102.8	104.4
35-39	97.7	94.6	114.6	109.6	101.1	110.5	99.3	88.8
40-44	90.5	96.4	88.8	95.7	94.9	87.3	102.3	111.8
45-49	108.8	98.9	107.8	93.4	103.1	98.9	91.2	78.3
50-54	106.8	113.2	97.2	116.0	100.8	106.9	110.8	128.4
55-59	76.2	71.3	81.2	65.1	80.6	75.3	85.6	68.0
60-64	121.3	130.6	136.3	153.3	125.1	126.5	130.8	163.3
65-69	82.2	81.7	82.0	66.6	95.5	99.2	74.2	61.8

Age ratio:North Africa

Age Group	Senegal 1976		S/Leone 1974		Togo 1981		Tunisia 1984	
	M	F	M	F	M	F	M	F
5-9	98.0	96.2	119.2	122.3	116.8	117.0	101.7	101.8
10-14	89.8	85.3	84.6	69.7	86.1	76.0	94.8	94.2
15-19	103.9	109.1	96.4	112.7	107.7	101.5	106.5	107.1
20-24	97.4	96.2	85.1	87.9	77.3	93.3	101.6	100.4
25-29	102.6	106.7	120.5	119.1	113.3	120.2	97.6	100.6
30-34	88.2	91.1	91.0	94.5	87.2	87.5	100.6	96.8
35-39	102.7	100.6	108.2	103.5	107.1	105.9	84.2	89.1
40-44	99.6	104.0	93.1	94.5	86.1	86.3	94.4	94.5
45-49	102.6	93.1	104.0	96.5	119.6	109.6	105.1	107.8
50-54	96.6	104.4	103.8	106.6	95.0	98.2	107.9	106.3
55-59	98.4	85.3	78.5	71.9	80.1	77.3	96.0	92.8
60-64	110.5	123.4	169.4	159.6	117.3	120.2	102.8	107.3
65-69	81.0	70.5	81.1	80.6	87.9	86.8	92.0	81.8

Northern Africa : Age-Ratio

Age Group	Algeria 1977		Egypt 1976		Libya 1973		Morocco 1982		Sudan 1973	
	M	F	M	F	M	F	M	F	M	F
5-9	98.4	98.7	82.8	93.8	104.9	107.8	102.9	103.1	123.3	123.1
10-14	102.3	101.2	121.0	113.1	100.3	96.2	102.1	97.7	87.6	81.8
15-19	94.8	93.8	104.4	95.2	85.3	84.3	94.8	100.5	94.5	95.6
20-24	100.5	105.3	87.9	97.2	94.2	92.6	105.7	105.0	79.3	85.0
25-29	103.2	97.2	103.3	102.7	100.0	107.9	100.7	97.4	122.2	131.8
30-34	78.2	82.4	88.3	93.3	91.4	84.5	95.6	95.6	85.0	84.7
35-39	101.8	105.8	103.9	101.0	106.9	118.1	82.4	83.7	123.4	114.7
40-44	106.2	103.7	103.2	107.1	98.8	91.0	106.0	119.7	90.5	91.9
45-49	100.4	102.2	95.4	87.4	107.6	108.2	95.8	85.0	98.4	89.6
50-54	93.8	90.1	113.1	129.0	93.8	96.2	114.5	129.1	108.8	118.1
55-59	103.3	103.9	80.4	66.9	90.3	82.5	82.0	68.8	68.7	62.3
60-64	91.0	94.4	128.0	149.8	101.3	115.9	131.1	157.2	138.6	151.0
65-69	113.8	111.3	78.5	66.8	96.9	84.1	73.9	52.3	-	-

Middle Africa Age Ratio

Age Group	Cameroon 1976		C A R 1975		Congo 1984		Eq.Guinea 1983		Sao Tome /Principe 1981	
	M	F	M	F	M	F	M	F	M	F
5-9	105.1	108.3	109.7	109.2	101.0	100.9	89.6	90.7	91.1	90.2
10-14	96.3	85.7	99.1	85.5	99.2	97.9	105.4	99.9	97.8	96.2
15-19	99.2	104.2	100.8	113.8	99.9	102.4	107.9	107.9	104.6	106.6
20-24	90.7	95.2	77.9	77.9	99.3	98.7	88.3	97.4	99.6	98.6
25-29	100.7	102.9	111.2	123.8	99.9	99.7	92.2	93.1	93.6	96.4
30-34	91.1	93.8	85.4	76.4	90.8	93.1	101.8	95.9	86.4	87.8
35-39	109.7	108.5	120.2	134.5	98.4	99.7	89.1	96.7	80.9	88.0
40-44	95.9	96.4	83.6	78.2	92.1	87.0	107.1	113.3	118.0	109.0
45-49	108.3	99.7	129.0	134.7	110.1	109.3	103.9	88.2	102.9	100.1
50-54	99.0	100.8	76.9	76.0	92.3	77.5	[illegible]	[illegible]	98.4	102.0
55-59	94.3	89.7	144.4	145.5	100.1	99.1	74.6	56.0	104.7	105.1
60-64	113.5	117.5	65.5	58.3	97.7	106.5	130.0	181.0	95.5	95.1
65-69	76.6	71.9	-	-	103.5	95.4	67.7	57.9	99.3	93.6

Eastern and Southern Africa : Age Ratio

Age Group	Burundi 1979		Comoros 1980		Djibouti 1983		Kenya 1979		Madagascar 1975	
	M	F	M	F	M	F	M	F	M	F
5-9	94.4	94.7	117.6	120.6	109.0	110.3	100.9	101.8	99.2	98.4
10-14	91.0	89.1	101.8	90.5	96.9	93.7	100.0	96.0	95.4	90.5
15-19	109.9	109.9	88.2	95.6	104.2	109.4	100.9	103.8	102.9	108.3
20-24	105.3	108.0	92.8	97.0	106.8	101.1	93.7	96.0	99.9	97.2
25-29	94.6	93.3	93.6	100.4	99.0	97.7	98.3	98.5	94.5	100.1
30-34	90.5	92.1	105.1	99.9	92.5	100.3	100.8	95.2	84.2	84.9
35-39	93.9	93.7	87.0	89.9	84.1	88.1	87.0	94.8	107.3	109.3
40-44	96.9	105.7	129.9	126.9	129.1	123.6	102.7	100.0	99.4	96.6
45-49	105.2	94.7	73.4	64.4	78.2	70.3	98.5	95.5	99.8	102.8
50-54	99.1	109.7	143.7	169.0	124.7	141.8	101.7	107.2	102.2	98.4
55-59	86.9	79.2	55.6	47.9	70.0	58.1	96.9	89.5	102.6	98.9
60-64	116.9	129.7	189.2	217.2	137.1	167.0	89.5	100.6	99.0	103.2
65-69	89.4	85.3	52.9	44.3	60.7	53.2	114.8	96.7	97.6	89.2

Age group	Malawi 1977		Mauritius 1983		Zambia 1980		Zimbabwe 1982	
	M	F	M	F	M	F	M	F
5-9	99.4	100.6	100.6	101.4	110.2	109.9	104.5	104.6
10-14	87.8	79.5	87.6	86.5	99.0	96.0	105.6	100.5
15-19	106.7	105.5	113.5	113.8	95.3	95.7	95.1	93.5
20-24	83.9	99.0	103.9	103.4	96.4	106.9	91.7	105.0
25-29	119.9	112.3	96.9	98.3	91.4	85.1	102.3	98.5
30-34	86.5	85.2	109.5	106.7	100.1	103.3	94.8	91.6
35-39	109.8	107.4	91.1	94.0	92.4	95.5	90.3	98.3
40-44	79.9	84.4	86.3	86.6	100.2	104.7	107.4	99.5
45-49	131.3	119.3	106.8	107.0	104.7	93.3	91.8	95.8
50-54	77.4	90.0	88.4	86.5	104.1	108.0	121.6	106.2
55-59	112.9	98.4	123.3	121.9	86.4	77.9	71.5	77.9
60-64	92.5	101.8	91.6	92.3	108.0	123.7	144.7	131.0
65-69	109.8	99.2	101.2	101.3	99.8	84.6	72.8	81.2

Age Group	Mozambique 1980		Rwanda 1978		Seychelles 1977		Tanzania 1978	
	M	F	M	F	M	F	M	F
5-9	102.3	108.5	89.8	90.2	99.6	96.6	106.0	106.4
10-14	105.5	92.0	93.5	94.0	103.6	111.5	95.6	90.4
15-19	96.4	90.3	109.4	108.5	111.8	108.7	101.8	98.8
20-24	86.6	106.2	104.9	102.5	94.2	90.7	80.8	93.9
25-29	95.7	94.2	95.8	96.1	94.9	87.3	116.9	112.8
30-34	107.6	106.1	81.8	84.6	88.2	88.4	87.2	87.8
35-39	87.4	92.4	93.5	101.1	100.5	109.9	112.8	104.7
40-44	112.2	109.6	104.0	104.7	98.8	100.3	84.6	91.9
45-49	93.5	88.2	99.3	94.4	104.5	94.3	115.4	106.5
50-54	115.1	115.3	101.6	103.9	100.1	107.4	88.9	97.3
55-59	77.3	73.3	95.5	95.8	98.9	99.8	101.1	85.0
60-64	125.3	135.7	108.1	112.7	93.1	87.5	104.5	120.4
65-69	77.8	76.0	106.6	96.8	112.7	127.9	90.6	87.1

Age Group	Botswana 1981		Lesotho 1976		Swaziland 1986	
	M	F	M	F	M	F
5-9	102.6	101.5	96.0	94.3	100.5	100.7
10-14	100.1	98.3	112.3	108.8	102.6	100.6
15-19	94.1	92.7	94.1	100.0	103.6	96.8
20-24	94.0	106.9	97.7	101.1	86.9	102.1
25-29	100.0	100.8	100.4	94.9	97.3	102.1
30-34	93.8	91.1	91.5	95.3	94.3	89.2
35-39	93.7	93.9	96.4	88.5	103.8	102.6
40-44	102.6	99.8	113.6	123.1	88.3	93.9
45-49	100.5	101.3	93.7	87.8	117.1	107.1
50-54	96.5	93.1	88.2	91.4	94.6	92.3
55-59	101.4	110.3	127.6	119.1	96.1	88.6
60-64	100.6	88.9	88.3	89.9	91.6	99.3
65-69	104.4	111.7	93.4	88.9	98.1	107.0

TABLE A.2: SEX RATIOS IN FIVE-YEAR AGE GROUPS : SELECTED ECA MEMBER STATES ,1970S and 1980s

Western Africa : Sex ratios

Age Group	Benin	Burkina Faso	Cape Verde	Cote d'Ivoire	Gambia	Ghana	Guinea Bissau	Liberia
	1979	1985	1980	1975	1983	1984	1979	1984
0-4	100.1	100.6	95.8	102.5	100.1	100.0	98.0	100.2
5-9	108.7	101.4	98.8	105.7	99.7	102.4	102.3	104.0
10-14	120.3	106.3	97.8	115.3	106.4	106.4	120.7	114.7
15-19	87.3	102.5	96.5	92.8	87.3	104.4	89.8	94.8
20-24	59.8	79.9	74.9	103.2	86.7	84.6	69.1	87.8
25-29	65.1	70.2	60.6	99.4	83.9	84.8	65.3	92.8
30-34	74.9	75.3	63.5	104.5	87.1	89.9	73.5	95.7
35-39	80.2	78.7	56.2	112.7	105.3	93.5	79.4	92.4
40-44	82.9	78.0	59.1	125.3	102.2	91.4	79.4	109.4
45-49	89.3	86.9	68.2	133.2	128.5	103.0	96.2	115.1
50-54	91.0	86.1	75.3	130.6	112.1	96.6	89.3	111.8
55-59	101.3	99.2	81.1	149.5	147.8	101.0	129.0	124.9
60-64	94.0	88.2	80.4	127.2	118.7	91.3	124.3	123.4
65-69	105.6	104.9	83.1	128.7	143.0	94.3	157.3	124.7
70-74	108.1	86.2	84.7	106.2	116.1	98.0	135.0	144.9
75-79	112.5	90.9	(	105.1	126.5	102.6	(	(
80+	109.5	66.8	(57.6	82.0	101.4	92.7	(138.9	(139.6
Total	92.1	92.5	84.8	107.4	99.0	96.5	93.1	102.4

Age Group	Mali	Mauritania	Niger	Senegal	Sierra Leone	Togo
	1976	1977	1977	1976	1974	1981
0-4	99.6	103.5	101.6	100.5	97.1	100.9
5-9	102.0	108.0	110.2	103.9	100.8	107.5
10-14	106.5	113.4	121.8	104.5	115.8	120.4
15-19	92.5	95.4	71.5	93.4	85.5	104.1
20-24	82.2	90.2	69.1	90.5	83.4	71.4
25-29	74.9	85.2	75.7	84.1	86.9	66.7
30-34	82.2	81.2	90.1	83.1	88.6	69.8
35-39	97.2	88.1	125.4	88.5	99.3	75.7
40-44	94.3	90.7	116.0	91.5	104.8	83.5
45-49	113.1	99.0	159.3	106.3	118.2	96.7
50-54	101.0	92.9	124.8	104.4	117.4	97.0
55-59	123.3	96.7	172.9	124.0	123.1	101.5
60-64	94.1	87.9	117.0	112.1	110.8	99.7
65-69	109.4	91.9	151.0	127.4	112.2	103.3
70-74	84.5	72.0	100.7	108.6	113.0	105.9
75-79	(	64.4	124.6	114.4	114.3	104.5
80+	(91.5	48.7	83.4	98.8	100.6	110.4
Total	95.5	96.8	98.3	97.9	98.8	95.1

Eastern and Southern Africa. Sex-ratios

Age	Burundi	Comoros	Djibouti	Kenya	Madagascar	Malaw	Mauritius	Mozambique
Group	1979	1980	1983	1979	1975	1977	1983	1980
0-4	98.6	101.7	107.5	100.0	100.8	95.9	101.8	95.7
5-9	98.9	103.6	108.0	100.2	103.8	98.1	101.6	97.3
10-14	100.1	112.5	111.2	102.6	106.2	106.2	103.1	115.0
15-19	96.8	93.3	106.9	96.2	96.7	93.1	102.0	105.2
20-24	93.3	84.3	113.3	93.5	95.9	76.6	101.6	76.7
25-29	93.9	80.9	107.9	95.0	87.8	87.4	100.1	79.9
30-34	88.4	90.1	95.7	98.2	88.4	90.1	101.4	81.1
35-39	83.8	92.7	97.2	89.2	90.9	90.8	96.9	80.3
40-44	77.5	103.2	110.6	95.5	97.5	86.9	97.3	90.2
45-49	88.6	115.6	122.5	98.6	100.0	92.9	98.6	99.8
50-54	76.4	98.8	109.0	95.8	110.4	81.1	100.7	100.5
55-59	83.0	117.1	123.0	104.6	116.0	96.9	98.7	102.2
60-64	74.9	103.4	99.1	98.3	113.8	89.1	93.5	91.4
65-69	83.1	121.1	107.3	120.0	123.8	100.3	86.6	93.5
70-74	88.6	102.7	82.9	106.1	111.4	93.6	74.3	91.3
75-79	104.0	119.8	89.9	(	115.8	102.4	59.4	89.0
80+	126.3	87.7	72.6	(101.3	97.4	92.9	39.5	97.8
Total	93.5	99.4	107.8	98.5	100.2	93.0	99.1	94.5

Age	Rwanda	Seychelles	Tanzania	Zambia	Zimbabwe	Botswana	Lesotho	Swaziland
Group	1978	1977	1978	1980	1982	1981	1976	1986
0-4	99.1	101.6	96.1	99.1	98.7	100.0	99.2	97.5
5-9	99.0	102.9	98.5	99.7	98.9	99.5	100.4	97.6
10-14	99.8	98.1	103.1	99.9	102.1	96.2	97.8	98.1
15-19	102.0	108.4	95.8	92.3	94.6	86.8	88.3	93.0
20-24	102.9	118.3	79.0	82.1	79.7	71.4	88.2	91.5
25-29	97.0	125.9	86.7	88.7	86.6	73.5	95.9	
30-34	86.0	111.4	90.6	83.6	89.7	78.7	94.5	79.8
35-39	76.9	96.4	98.4	82.9	96.9	81.6	102.2	82.5
40-44	80.0	99.3	92.2	86.6	101.8	86.2	93.8	84.2
45-49	85.3	106.4	102.7	107.5	105.5	86.8	99.0	99.9
50-54	82.5	92.2	98.5	107.3	123.0	89.3	92.3	103.6
55-59	83.1	90.0	117.2	118.5	110.9	85.3	92.2	103.4
60-64	84.6	88.8	98.3	106.1	117.8	98.1	77.9	82.6
65-69	97.9	76.1	107.5	126.6	99.9	88.8	75.6	73.1
70-74	106.0	82.7	113.1	110.9	97.7	89.7	62.1	75.2
75-79	102.4	(	120.9	126.2	(	85.9	53.2	72.6
80+	108.2	(54.5	122.5	102.7	(88.5	64.4	42.6	58.2
Total	95.7	101.4	96.2	95.8	96.0	89.0	93.3	

Middle Africa : Sex-ratios

Age Group	Cameroon 1976	Central African Rep. 1975	Congo 1984	Equ Guinea 1983	Sao Tome Principe 1981
0-4	101.8	98.1	101.0	99.7	103.4
5-9	102.0	105.5	100.2	99.1	104.8
10-14	116.0	115.9	99.1	101.1	104.3
15-19	95.1	91.7	94.8	92.1	99.8
20-24	84.9	84.9	94.8	80.0	98.2
25-29	81.5	76.4	93.5	80.9	92.6
30-34	81.2	85.2	90.6	84.3	89.7
35-39	86.0	76.2	91.7	77.6	88.7
40-44	90.2	85.2	96.4	84.0	103.8
45-49	97.7	84.8	90.3	103.5	102.9
50-54	98.2	93.4	82.1	93.2	95.8
55-59	104.1	98.1	79.6	114.0	94.9
60-64	100.4	112.5	74.1	75.5	94.2
65-69	103.6	106.6	83.0	92.3	92.1
70-74	91.1	(	84.0	85.3	75.9
75-79	98.3	(118.9	80.7	107.0	64.1
80+	97.8	(	71.9	111.6	60.2
Total	95.9	92.1	94.8	92.4	98.9

Northern Africa : Sex ratios

Age Group	Algeria 1977	Egypt 1976	Libya 1973	Morocco 1982	Sudan 1973	Tunisia 1984
0-4	104.2	102.2	102.8	102.9	104.8	105.6
5-9	104.2	94.0	102.5	103.7	107.7	105.2
10-14	105.0	111.1	109.5	105.4	111.9	105.0
15-19	103.2	115.8	110.3	97.0	98.3	103.4
20-24	97.9	97.5	107.7	99.7	82.9	102.7
25-29	101.4	97.0	100.2	102.1	80.2	98.5
30-34	90.9	94.9	108.9	97.4	90.5	99.8
35-39	88.2	99.5	101.2	89.0	105.2	91.8
40-44	92.4	98.8	115.3	82.0	109.0	93.3
45-49	93.1	107.0	113.6	96.8	121.5	95.1
50-54	93.4	96.9	112.6	90.9	113.2	102.3
55-59	96.6	117.0	119.3	112.4	126.4	109.7
60-64	95.4	97.9	104.2	99.3	117.8	112.3
65-69	102.5	110.5	118.9	133.5	131.3	132.6
70-74	109.0	86.2	102.0	91.8	(	128.1
75-79	95.9	(	127.6	(	(	124.7
80+	89.7	(86.2	105.3	(118.9	(115.9	110.5
Total	100.6	103.7	106.4	100.2	102.3	103.4

TABLE A.3

Myers Indexes of Preference Selected ECA Member States
By sex and sub-regions 1960s, 1970s and 1980s

Sub-region/ Country	Census year	Indexes of Preference		
		Total	Male	Female
Northern Africa				
Algeria	1966	-	5.1	9.2
Libya	1973	10.5	7.0	15.3
Morocco	1960	-	33.2	43.7
"	1971	28.4	23.4	33.0
Tunisia	1966	-	5.0	8.6
"	1984	2.3	1.8	3.0
Western Africa				
Benin	1979	19.6	18.2	21.1
Burkina Faso	1975	24.9	23.6	26.2
Gambia	1973	25.0	23.4	26.6
"	1983	24.0	22.1	25.9
Ghana	(1960	-	29.6	31.2
	(1970	-	14.0	16.0
	(1984	15.9	14.0	17.3
Guinea-Bissau	1979	22.3	20.0	22.6
Liberia	(1974	-	27.9	29.6
	(1984	-	20.0	26.8
Mali	1976	20.6	18.0	23.2
Mauritania	1977	18.5	16.4	20.3
Niger	1977	41.1	38.9	43.2
Sao Tome &Principe	1981	2.0	2.2	1.9
Senegal	1976	13.2	11.2	15.2
Sierra Leone	1974	22.4	22.3	24.6
Togo	1970	13.8	13.8	14.0
Middle Africa				
Cameroon	1976	17.4	15.4	19.2
Central African Rep.	1975	13.4	11.1	15.8
Congo	1984	4.6	4.3	4.9
Equatorial Guinea	1983	9.5	6.8	11.9
Eastern Africa				
Burundi	1979	9.0	7.0	11.0
Comoros	1980	25.6	24.7	26.5
Kenya	1979	7.2	6.4	8.1
Madagascar	1974/75	10.0	8.4	11.6
Malawi	1977	7.6	6.6	8.6
Mauritius	1972	2.3	2.0	2.7
	1983	1.1	1.1	1.2
Rwanda	1978	6.1	5.2	7.0

TABLE A.3 (Contd.)

Sub-region/ Country	Census Year	Indexes of Preference		
		Total	Male	Female
Seychelles	1977	0.3	0.4	0.4
Tanzania	1978	15.1	13.2	16.9
Zambia	1969	-	14.8	15.8
	1980	7.3	7.1	7.5
Southern Africa				
Botswana	1971	5.3	5.0	5.3
	1981	3.7	3.7	3.8
Swaziland	1966	-	10.2	8.5
	1976	7.2	7.0	7.4
	1986	5.8	5.6	5.9

Source :

- ECA Population Division
- ECA/RIPS, WorkBook on Demographic Data
- Evaluation and Analysis RAF/87/P05 (Addis Ababa:1989)
- P.O. Ohadike, Determinants of Quality of Age Data: A case Study of the 1974 Liberia Census, RIPS Working Papers, RIPS/WPS/2/87
- T.J.Makannah, "An Evaluation of the Age and Sex Data of the 1963 and 1974 Population Censuses of Sierra Leone", Unpublished manuscript.
- UNECA, "Techniques of Evaluation of Basic Demographic Data", African Population Studies Series No.2, 1975

TABLE A.4 : Patterns of Digital Preference (selected African Countries

Country		0	1	2	3	4	5	6	7	8	9
	M	12.68	9.18	9.91	9.22	9.15	10.77	9.78	8.94	10.26	10.10
Botswana 1981	F	12.35	9.14	10.11	9.39	9.12	10.50	9.79	8.86	10.50	10.25
Burundi	M	14.80	8.34	9.32	8.56	8.92	12.78	8.62	9.36	10.00	9.72
1979	F	17.74	7.46	9.27	8.03	8.51	12.47	7.50	8.42	10.57	9.24
Comoros	M	29.44	4.73	6.46	5.98	6.15	15.29	7.19	7.41	9.65	5.70
1980	F	30.98	4.16	6.10	5.31	5.77	15.55	7.29	7.25	9.66	5.92
Congo	M	10.43	8.83	10.57	7.80	11.81	10.82	10.59	9.34	9.76	10.04
1984	F	10.53	8.53	10.25	7.46	12.63	10.54	10.39	9.12	9.95	10.60
Equatorial Guinea	M	15.24	8.11	9.36	8.90	8.85	11.33	9.23	9.25	10.20	8.52
1983	F	20.24	6.90	8.70	9.13	7.73	11.38	9.03	8.40	10.25	8.14
Gambia	M	24.65	5.41	8.09	6.97	6.29	17.51	7.80	7.24	9.93	6.13
1983	F	27.88	4.85	7.38	5.86	5.82	17.68	7.61	6.71	10.14	5.88
Mauritania	M	21.08	7.73	8.12	6.25	8.34	12.01	13.32	7.02	8.52	7.61
1983	F	24.66	7.09	7.23	5.76	7.29	12.25	13.41	6.92	7.97	7.42
Mauritius	M	10.06	9.77	9.86	9.96	9.56	9.76	10.04	10.11	10.23	10.63
1983	F	10.03	9.69	9.77	10.02	9.50	9.96	9.91	10.17	10.39	10.55
Niger	M	36.27	2.79	6.52	4.24	3.80	22.58	4.55	9.30	6.86	3.08
1977	F	39.93	1.90	5.10	3.13	3.19	23.32	4.37	9.35	7.04	2.67
Rwanda	M	11.10	9.06	9.79	9.96	9.63	8.97	10.71	7.89	13.38	9.52
1978	F	11.75	8.63	9.69	10.17	9.38	8.81	10.38	7.43	14.67	9.05
Sao Tome and Principe	M	9.34	11.38	10.13	9.95	9.39	9.31	10.22	10.05	10.37	9.85
1981	F	9.51	11.09	9.92	9.41	9.93	9.55	10.60	10.24	9.99	9.78
Swaziland	M	12.11	8.39	10.12	8.49	9.62	11.30	10.65	8.66	11.46	9.20
1986	F	12.76	8.46	10.32	8.71	9.45	11.08	10.03	8.28	11.66	9.25

(Contd.)

Country		Digital Preference 0	1	2	3	4	5	6	7	8	9
Tanzania	M	15.90	6.35	9.65	7.36	8.40	14.36	9.49	7.81	12.92	7.75
1978	F	18.92	5.83	9.61	6.83	7.92	14.60	8.63	6.83	13.36	7.48
Tunisie	M	10.17	10.02	9.42	10.42	10.29	9.79	9.46	9.73	9.85	10.86
1984	F	10.05	9.65	8.85	10.75	10.65	9.80	9.20	9.53	10.00	11.49
Zambia	M	13.46	8.58	11.10	8.68	9.05	10.36	10.39	8.00	11.83	8.55
1980	F	14.21	8.70	11.29	8.52	9.26	10.06	10.14	7.65	11.80	8.36
Ghana	M	17.67	6.09	10.71	6.80	8.75	14.98	9.37	7.71	11.04	6.88
1984	F	20.15	5.69	10.49	6.48	8.29	15.20	9.29	6.66	11.51	6.25
Burkina	M	17.04	7.47	8.76	8.62	6.84	15.67	8.21	10.84	8.37	8.19
Faso1975	F	20.86	6.83	8.32	7.66	6.03	16.86	7.25	10.50	7.78	7.92

TABLE A.5: Myers Index of Preference : Urban and Rural Areas of Selected African Countries

Country	Census Year	Division	Myers index of Preference Total
Benin	1979	Urban	16.2
		Rural	22.1
Central African Republic	1975	Urban	9.8
		Rural	15.4
Liberia	1974	Urban	11.6
		Rural	15.8
Libya	1973	Urban	8.0
		Rural	14.0
Mali	1976	Urban	12.0
		Rural	22.8
Rwanda	1978	Urban	5.0
		Rural	6.4
Zambia	1974	Urban	5.7
		Rural	7.8

Source : M. Bailey, "Patterns of Digit Preference and Avoidance in the Age Statistics of some Recent African Censuses, 1970 - 1982", unpublished manuscript.